Low Impact Development Strategies for Rural Communities

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Abstract
The Friends of the Rappahannock and the Low Impact Development Center, Incorporated (both non-profit organizations) are developing guidance and strategies for rural communities in Virginia to incorporate LID into their local resource protection and regulatory programs. This project was funded by the National Fish and Wildlife Foundation, under a grant from the Chesapeake Bay Program. The Town of Warsaw, Virginia is the municipal partner in the grant. The first part of this effort includes evaluating state and local codes to determine what, if any, necessary legislative, code, or local regulations need to be modified to include LID. Identifying areas in the Town and land uses that are appropriate for LID technologies follow this effort. The next step will be to develop materials for developers and plan reviewers to help guide them through the development process when the use of LID is appropriate. The final step will be to design and implement a small demonstration project that showcases LID features, such as rain gardens, soil amendments, permeable pavers, and infiltration devices. This paper will document this effort and identify key issues that other communities should consider when contemplating the use of LID.

Background
The Town of Warsaw, Virginia is a rural locality in Virginia's Northern Neck, located between the Rappahannock and Potomac Rivers. Figure One shows the vicinity of the town in the watershed. The Town and County have historically had strong economic ties to the surrounding rivers, although this has declined in recent years due in particular to the decline of oyster harvests. The Town does not have a strong economic base, and recently lost a major employer, a Levi's plant. The Town recently annexed a portion of its "parent" County for the purposes of economic development. This former agricultural land is highly suitable for development, and is situated along the area's major 4-lane highway. The nature of future development in Warsaw is currently unclear, although current trends tend toward assisted-living and retirement communities, along with supporting services. Town officials expressed an interest in Low Impact Development strategies after seeing presentations at various local government and watershed management conferences. They were concerned about the stormwater infrastructure costs associated with new development in the annexed land, as well as with the aesthetic and environmental impacts of conventional pond treatment of stormwater runoff. The Town currently has only one stormwater management pond, that was recently put in as part of a new shopping center. There have been numerous complaints by the property manager and adjacent property owners about the maintenance and aesthetics of the facility. The town is also concerned about the inspection, ongoing maintenance, and potential rehabilitation costs of conventional end of pipe pond systems. This has caused the town to revaluate its existing stormwater program. Figure 2 is a map of the annexed areas and drainage master plan that shows existing drainage problems and projected stormwater pond locations. The Town views LID strategies as a means of reducing costs while also increasing community aesthetics and environmental protection. The Low Impact Development Center, the Friends of the Rappahannock, and the Town of Warsaw teamed up on

a joint grant proposal to the EPA Chesapeake Bay Program (through the national Fish and Wildlife Foundation) to develop a model approach for incorporating LID in rural communities.

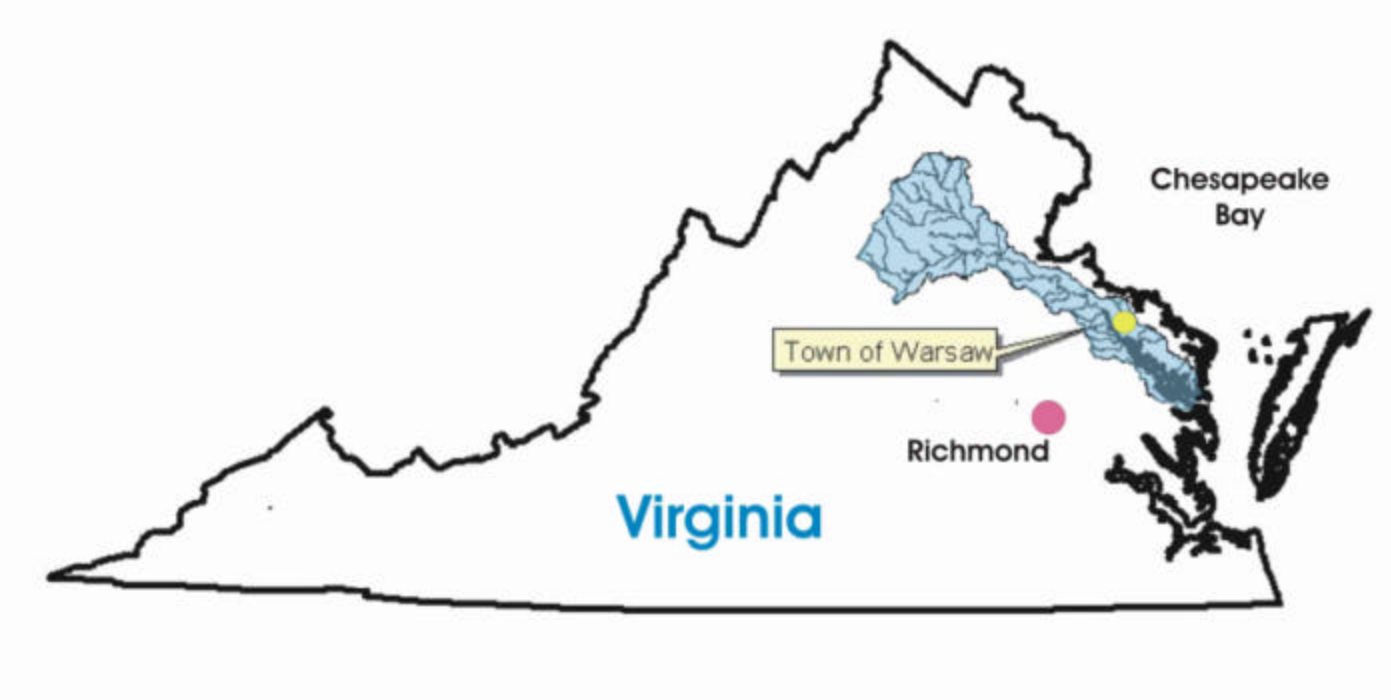

Figure 1: Rappahanock Watershed

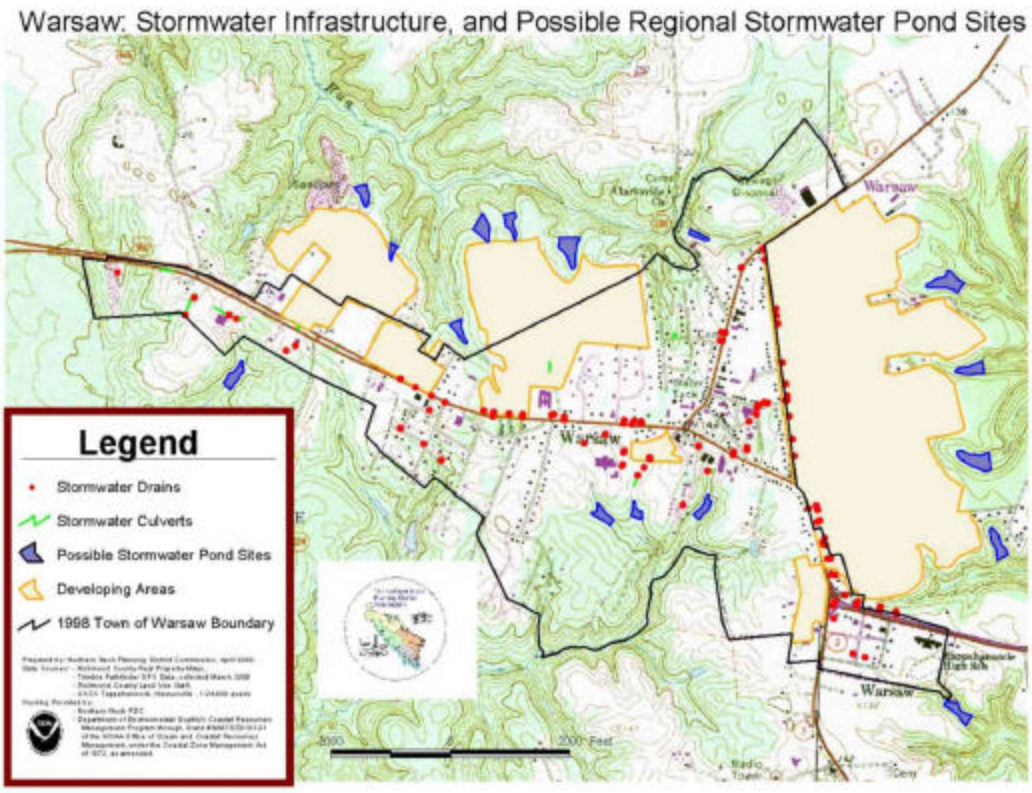

Figure 2: Potential Pond Locations

Evaluation of Local Codes

The project initiated with an evaluation of local (Town and County) codes and ordinances to determine compatibility with LID. Most local governments, especially rural ones, reference the State BMP design manual and Stormwater handbooks for guidance (VADCR 2001). A review of the local and state guidance indicated that the codes allowed the use of many (though not all) types of LID stormwater management practices. However, there were no mechanisms in the language to promote LID designs in lieu of conventional approaches. Additionally, the conventional approach was designed around detention/retention of the 2-year storm, while the LID approach is designed around the replication of pre-development hydrology, which focuses on infiltration of the increase in "initial abstraction" on a site, and maintaining pre-development Time of Concentration.

While practices such as bioretention were permissible in the state guidance, there were other practices without design guidelines or standards by which to calculate pollutant removal or water volume detention. Most notable was the LID practice of "amended soils." Another deficiency in the stormwater guidance was a table used to determine appropriate BMPs for a site. The guidance recommended using bioretention only on projects with low levels of impervious cover. Another weakness was a specific recommendation against the use of infiltration practices under parking lots.

Project leaders met with Commonwealth of Virginia officials to discuss these barriers. Most were agreed upon for revision in subsequent volumes of the stormwater guidance. On the issue of the conventional versus LID approach to stormwater management design, it was generally agreed that the LID approach meets or exceeds the Commonwealth water quality and quantity requirements, as long as the designs also meet the Commonwealth's provision for having an "adequate receiving channel" (Minimum Standard 19 VADCR).

Assessing Local Government Needs

The Town Manager's interest in LID stemmed form a desire to reduce infrastructure and maintenance costs, to increase community aesthetics, and to reduce impacts to the local aquatic resource. Figure Four is a map of the potential number of conventional ponds that could be constructed at the ultimate buildout of the community under conventional stormwater management scenario. Based on the towns maintenance and construction experience with the recently conventional management pond it recognized that the pond strategy would potentially be unsustainable and would be impact other funded programs. Consequently, the project was designed around developing a plan to institute LID as the standard development approach Town-wide, and possibly to be expanded to the county in which the Town resides.

Project staff conducted meetings with Town and County officials to determine their needs in regard to instituting an LID development program. The issue that emerged in the forefront was the lack of criteria that local government plan reviewers had for assessing an LID site design. There were significant concerns, based on prior experience, that "token LID" plans would be submitted (i.e., plans that included some LID practices, but did not achieve the quantitative LID goals) and that staff would not have the means by which to evaluate the merits of the plans. Additionally, there concern on the parts of local officials that the development community was unfamiliar with the LID approach to site design and stormwater management, and that it would be difficult to have quality LID plans submitted.

This project has far reaching implications for many rural Virginia communities. It demonstrates how local governments can work with regulatory agencies to develop and implement a stormwater program that meets

both regulatory requirements and community environmental and fiscal programs. For a relatively small cost, communities can develop their own programs, obtain resources to train review and maintenance personnel to deal with more complex stormwater design and construction issues, and gain acceptance by political, business, and citizens within the community for innovative programs.

Developing an Action Plan

Based on the evaluation of codes and local government needs, the following action items were developed:

1. Develop policy language for instituting LID as the standard practice for project site design and stormwater management
2. Create easy-to-use LID review guidelines for local plan review staff
3. Create a reference document for developers to use in designing LID plans
4. Create an LID educational brochure targeted to citizens
5. Develop a list of specific recommendations for changes to Commonwealth stormwater design guidelines to better support LID at the local level

Demonstration Project

A demonstration project to model the LID design approach is planned for a Virginia Department of Transportation (VDOT) Commuter parking lot. A rain garden and pervious pavers are planned for the demonstration. The project is currently pending funding from VDOT.

Project Products

The policy language developed for the Town establishes the LID approach as the standard methodology within the jurisdiction for stormwater management methodology for new developments. The language includes references to the LID National Manual for design guidelines, and to other guidance products created under this project. The language is currently under review by the Town and County officials for inclusion in the local stormwater management ordinance.

The guidelines for developers and plan reviewers underwent an iterative process of revision between the project leaders, state stormwater management officials, and town staff. The resulting guidelines are designed to lead a developer with little familiarity of LID through the process of creation a viable LID site design. These guidelines are outlined through a series of checklists, flow charts, and references to guidance documents and technical information that can be incorporated into the development process. Figure 3 is a design process flow chart that was developed as part of the guidelines. The goal is the development of a site to mimic pre-development levels of infiltration, runoff, and Time of Concentration. The guidelines include the development of pre-, post- and "LID" curve numbers, and recommended means of accounting for volume storage achieved by practices such as bioretention and amended soils. Also included is a flowchart depicting the LID design process. An option for a hybrid approach (using conventional practices to make up for excess volume not managed by LID practices) is built in to the guidelines, but is discouraged.

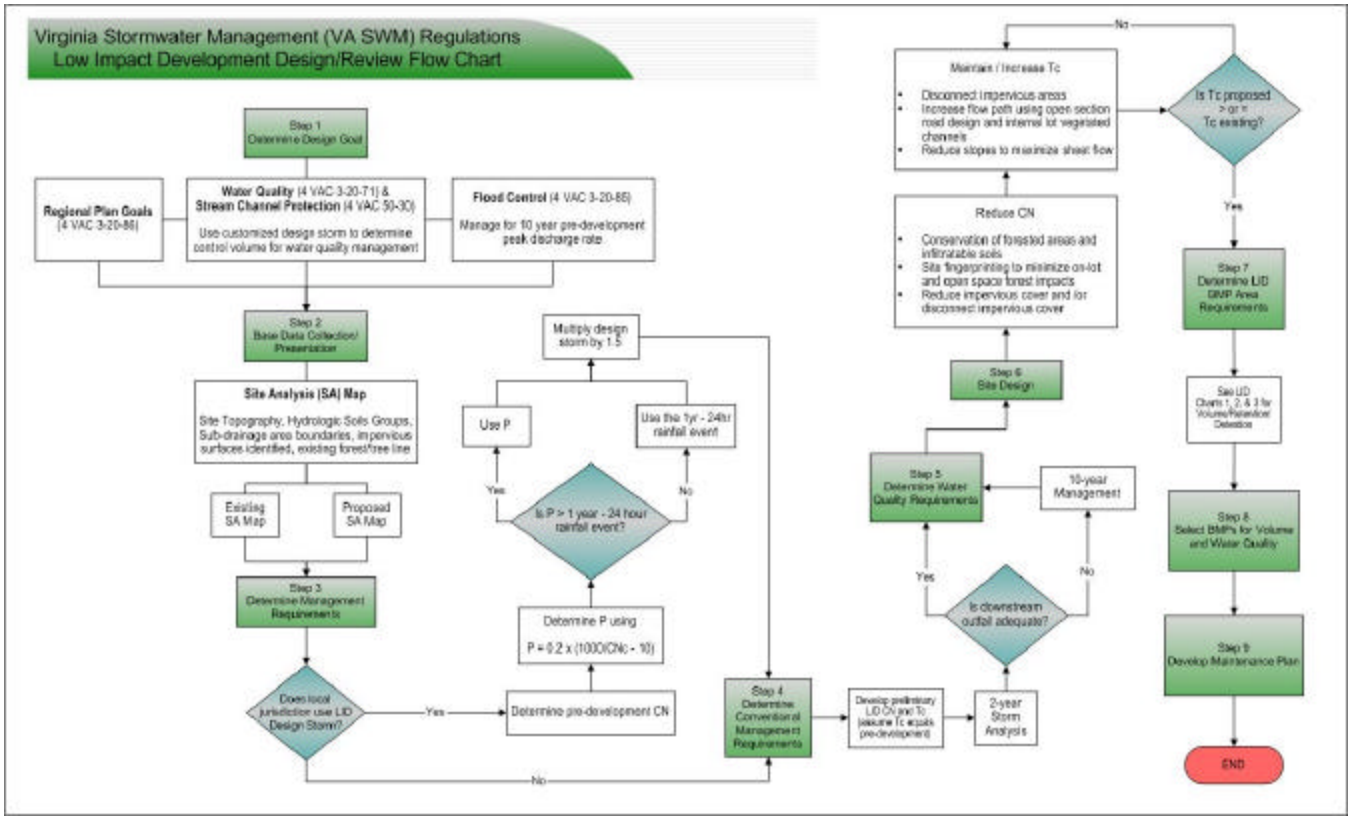

Figure 3: LID Flowchart

Project Follow Through

The projects have just been delivered to the local government and are currently being evaluated for formal adoption in the ordinance. The rate of development in the Town is currently very low. The first project to be reviewed under the new LID approach is expected to be completed within the next several months. The products of this project are being made available to other local governments to help guide their adoption of LID strategies. Additionally, a multimedia CD is currently being developed which chronicles the Warsaw project and includes the project deliverables. Project products are available on the web at http://for.communitypoint.org.

Background and References

Friends of the Rappahannock Website, http//:for.communitypoint.org

Low Impact Development Center. 2002, Low Impact Development Stormwater Resource Website. http://www.lid-stormwater.net

Prince George's County Maryland, 1999, Low Impact Development Design Strategies, Prince George's County, Maryland

Virginia Department of Conservation and Recreation, 2001. Virginia Stormwater Management Handbook, Richmond Virginia. http://www.dcr.state.va.us/sw/stormwat.htm